

Einstein' s Miraculous Argument of 1905: The Thermodynamic Grounding of Light Quanta

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Abstract

A major part of Einstein' s 1905 light quantum paper is devoted to arguing that high frequency heat radiation bears the characteristic signature of a microscopic energy distribution of independent, spatially localized components. The content of his light quantum proposal was precarious in that it contradicted the great achievement of nineteenth century physics, the wave theory of light and its accommodation in electrodynamics. However the methods used to arrive at it were both secure and familiar to Einstein in 1905. A mainstay of Einstein' s research in statistical physics, extending to his earliest publications of 1901 and 1902, had been the inferring of the microscopic constitution of systems from their macroscopic properties. In his statistical work of 1905, Einstein dealt with several thermal systems consisting of many, independent, spatially localized components. They were the dilute sugar solutions of his doctoral dissertation and suspended particles of his Brownian motion paper.

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